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MEMOIR *on the* CLIMATE *of* IRELAND. *By the* REV. WILLIAM HAMILTON, *of Fanet, in the County of Donegal*; *late Fellow of* TRINITY COLLEGE, *Dublin*; *M. R. I. A.* *Correſponding Member of the Royal Society of Edinburgh, &c.*

Read Dec. 6, 1794.

IT is generally ſuppoſed that the ſeaſons, in our iſland, have ſuffered a conſiderable change, almoſt within the memory of the preſent generation. The Winters of our climate are ſaid to have laid aſide their ancient horrors, and frequently to have aſſumed the mildneſs and vegetative powers of Spring; while Summer is repreſented as leſs favourable than heretofore; leſs genial in promoting vegetation, and leſs vigorous in forwarding the fruits of the earth to maturity.

IT is indeed true that, in this inſtance, popular opinion does not ſtand ſupported by the concurrent teſtimony of meteorological obſervations: There is no clear evidence derivable from them, that the preſent ſeaſons are materially different from former ones;

and therefore philoſophers and meteorologiſts naturally aſcribe to the querulous diſpoſition of the farmer the chill ſenſations of old age, or the predilection which every one feels for the chearful days of childhood, the adoption of an opinion that ſeems ſo eaſily to flow from theſe ſources.

But let it be remembered that the inſtruments of atmoſpherical obſervations do not extend to *all* the circumſtances, which influence the crops of the farmer, or the ſenſations of the man. The thermometer may mark the general temperature of our climate as unchangeable; and the pluviometer may aſcertain its uſual moiſture; whilſt a clouded atmoſphere, or a tempeſtuous wind, ſhall mar the progreſſive maturity of harveſt, and ſhatter the languid frame of declining age.

Heat and cold, and rains, are indeed principals in the œconomy of ſeaſons; but winds, clouds, vapours, and other circumſtances rarely regiſtered, often unperceived, are to be deemed at leaſt ancillary in the extenſive ſyſtem; and may give plauſibility to popular ſenſations and opinions, even without the aid of meteorological teſtimony.

It is the purpoſe of this paper to offer to the Academy ſome obſervations relating to this intereſting ſubject; and to mark a few prominent events in the phænomena of our climate, which may add credibility to general report.

Of the Winds and their Effects.

THE winds, which moſt uſually prevail in our latitudes, blow from the Weſtward, for reaſons unneceſſary to be detailed here. Theſe winds are commonly mild in their temperature, and moiſt in their nature. They are, from theſe properties, extremely friendly to animal and vegetable life; and to them the great population of Ireland, and the uncommon fertility of its ſoil, may, among natural cauſes, be aſcribed.

BUT, from whatever circumſtances it has ariſen, theſe winds have, of late years, ſwept with uncommon violence over the ſurface of our iſland; fruſtrating the uſual effects of their genial properties by the overbearing fury of their courſe; and, like Saturn, ſometimes devouring the offspring to which themſelves had given birth.

WHY theſe weſterly winds have ceaſed to bear the character of zephyrs may admit of much curious and intereſting inveſtigation: at preſent I ſhall be ſatisfied with endeavouring to eſtabliſh the fact itſelf, by ſuggeſting to the Academy ſome circumſtances that ſeem to determine the matter with a very great degree of probability.

THE effects of theſe winds are marked, in viſible characters, over the whole ſurface of the kingdom; but they are peculiarly diſtinguiſhable in the northern province of Ulſter; and chiefly in the extreme counties of that province, where a northerly latitude, joined to an expoſed ſituation on the coaſts of the ocean, forms an apt ſtation for obſervations, and exhibits, as it were on a magnified ſcale, the degrees of the phænomena themſelves.

THREE natural regiſters of theſe effects have come within my obſervation; the trees of the country, the ſands of the ſea coaſt, and the tides of the ocean: Of each of theſe I ſhall make mention in its order.

Of the Trees.

IT is a fact extremely well eſtabliſhed, that the pine tree, and peculiarly that ſpecies vulgarly denominated the Scotch fir, formerly grew on many of the mountains of this kingdom, and on parts of the northern and weſtern coaſts, exceedingly bare and open to ſtorms. Vaſt roots, and noble trunks of this ſpecies of pine have been ſeen and examined by me with attention, in ſituations where human induſtry cannot now rear a twig of the hardieſt tree. On the higheſt lands of the general ſurface of the kingdom, in the county of Weſtmeath, amid the mountains of the county of Antrim, and on the naked coaſts of Eniſhowen, and Roſſes, in the county of Donegal, pine trees have formerly arrived at an age of an hundred and twenty years, have grown to the ſize of a yard in diameter, and ſurpaſſed fifty feet in height.

THERE is great reaſon to think, that two centuries have hardly elapſed ſince many of theſe trees grew in thoſe ſituations; and probable reaſons might be adduced, to limit the great period of their deſtruction to the age of James the firſt of England; in whoſe reign rewards were held out for ſettling the kingdom, and clearing its ſurface of foreſts, which, under favour of inceſſant wars, and neglected tillage, during a period of eight centuries, had overſpread the face of the country *.

THE harſh and furrowed bark of this pine has occurred to me, in ſuch a perfect ſtate of preſervation, as almoſt alone to determine its ſpecies †.

THE cones have been found by me at a depth of many feet from the ſurface of the earth, in ſuch condition as almoſt to give hope of raiſing plants from their ſeed ‡. Marks of the woodman's hatchet

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* "In this reign pipe-ſtaves was one of the ordinary exports of Ireland; ſo that "a mighty trade was driven with them, and thouſands of trees were felled, every "year, for this purpoſe. A multitude of iron-mills were erected; and it is in-"credible how much charcoal a ſingle iron-mill will conſume in one year. So that "all the great woods, which the maps ſhew us on the mountains, between Dundalk "and Newry, are quite vaniſhed, except one tree, cloſe to the highway, at "the very top of the mountain, which, as it may be ſeen a great way off, therefore "ſerveth travellers for a mark."

"Yet there are ſtill great woods remaining in Dunnagall, in Tyrone, in Antrim, "&c." See Nat. Hiſt. of Ireland by Boates, Molleneux, and others, written about the middle of the laſt century.

† In Bracknaheevlin bog, county of Weſtmeath.

‡ In Lackbeg bog near Rutland, county of Donegal.

hatchet on their trunks; veſtiges of fire applied for their deſtruction; the pieces of charcoal into which many of them have been burnt *; paleings, and ſmall encloſures, found at the level where they have formerly grown †; all ſeem to prove the interference of human induſtry in the extirpation of theſe noble trees, and even to aſſign no very remote period for that event.

LEATHERN ſhoes, wooden veſſels filled with butter, and other light ſubſtances, found at conſiderable depths in turf-bogs ‡, and not likely to have deſcended through the matted texture of that ſubſtance, give additional teſtimony to the opinion, that the exiſtence of theſe bogs, and, of courſe, that of the trees which they contain, is not of an extremely ancient date.

IT is needleſs to recal the attention of the Academy to the difficulty of raiſing trees, at preſent, in many of thoſe ſituations where the ancient pine and oak of Ireland have, within the period of human exiſtence, flouriſhed with luxuriance.

THE

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* Found in a bog in the liberties of the city of Londonderry.

† In a bog near Surock, county of Weſtmeath: near Kilruſh, county of Clare; at Carniſk, near Ramelton, county of Donegal.

‡ Omitting other inſtances: Two wooden veſſels, containing butter, were very lately found deep in a turf-bog, in the Fews mountains, near Ballymoire, the ſeat of Sir Walter Synnott. The veſſels were extremely inartificial, being little better than the hollow trunks of ſome large ſpecies of willow: the butter was inſipid, inodorous, colourleſs, ſomewhat reſembling unctuous white ſteatites in its touch and appearance; but its inflammability remained ſo perfect, as to admit of its being made into candles, to which uſe much of it was applied.

THE labours of the farmer, the reſources of wealth and information, the rewards of patriotic ſocieties, and even the liberal encouragement of the legiſlature itſelf, have in vain ſtruggled againſt the weſtern ſtorms, during the latter part of the preſent century; and the planters of our age, wearied with combating the tempeſt, have generally found it neceſſary to fly from all elevated and expoſed ſituations, and to abandon the pleaſing idea of covering the nakedneſs of mountains, the ſterility of rocks, and the bleak uniformity of bogs, with the luxuriant foliage of the oak and the pine.

OF all the foreſt trees, which, in later times, have been cultivated for general uſe, there is none higher in the eſtimation of our farmers than the aſh. It is a tree which buds late, but finally iſſues forth ſtrong and ſucculent ſhoots: ſecure, by its deciduous nature, from wintry blaſts, it is, nevertheleſs, extremely ſenſible to the efforts of ſummer ſtorms; and becomes a faithful regiſter of the winds of our climate, marking their moſt prevalent direction by the inclination of its boughs, and their violence, by the degree wherein its tender ſhoots, or more mature branches, are withered or blaſted.

HALF a century has ſcarce elapſed ſince this uſeful ſpecies of tree was generally planted, and grew luxuriantly in every part of Ireland: yet are there hardly any expoſed places in the kingdom where its top branches do not now, in one part or another, exhibit the withered veſtiges of commencing decay. Through many parts of Ulſter it is a blaſted tree; and in all unſheltered ſituations, in the three northern counties of Antrim, Derry, and Donegal, the ſpecies ſeems faſt verging toward annihilation *.

ATTENTIVE to each prognoſtic of the ſeaſons, alive to every circumſtance whereon the future ſubſiſtence of his numerous family, in a populous country, may depend, the farmer of the north ſees theſe veſtiges of the tempeſt with ſolicitude; and often taught, of late, to dread the effects of ſummer ſtorms on his luxuriant crops of potatoes, he has become querulous from experience, and thinks he has ſome reaſon to complain that the ſeaſons are leſs favourable to his hopes than formerly; that the pine tree has not forſaken the mountains, nor the aſh been blaſted in his fields, without the influence of encreaſing tempeſts.

Of the Sands.

THE waſte and dreary ſolitude of extended barren ſands, which almoſt every ſea-coaſt exhibits, is generally paſſed over with rapidity, as uſeleſs to the philoſopher, from the incalculable fluctuation of its ſurface; and weariſome to the traveller, by its diſguſting uniformity.

YET, in the midſt of ſuch a ſterile ſcene, where nothing occurs to divert the path, or diſtract the penſive mind of the traveller, if traces of human exiſtence ſhould ſuddenly become viſible, if encloſures ſhould appear to mark the chearful fire-ſide of ſome former villager, or the circuit of his little garden; if embattled walls, or marble piers ſhould ſtart up amid the ſands, ſuggeſting ideas of ancient elegance and feſtivity, he muſt have a ſtoic's mind, indeed, who will not venture to calculate cauſes, and feel intereſted in events that come home ſo cloſely to the human heart.

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* In Lancaſhire in England, between Garſtang and Preſton, the trees are alſo cut off by the weſterly winds. See Newte's Tour, year 1791.

On many parts of the coaſt of Ireland ſcenes, ſuch as theſe, may be diſcovered.

At the entrance of the river Bannow, in the celebrated barony of Forth, in the county of Wexford, veſtiges of ruins, traced with difficulty amid heaps of barren ſand, ſerve to aſcertain the ſite of a town, whoſe ancient reſpectability was marked by the royal charter, which endowed it with the privilege of ſending repreſentatives to the parliament of the nation, and whoſe opulence may be inferred from the ſtreets which are regiſtered in the revenue records of the laſt century *.

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* "So late as the year 1626, Bannow is regiſtered in the cuſtom-houſe books of Wexford, as having four ſtreets which paid quit-rent to the crown; viz. Lady-ſtreet, High-ſtreet, Weavers-ſtreet, Little-ſttreet, and ſome buildings ſurrounding the church. The only remains of Bannow, which ſtand viſible at this day (1786), are the walls of its church. There is not on or near the town but one poor ſolitary hut. The election for the repreſentatives of the town is held on the walls of an old chimney, adjoining to the church, which tumbled down piece-meal, and forms the council table of that ancient and loyal corporation."

Private letter of a friend in the county of Wexford.

Amid the ſands between Portruſh and Dunluce, in the county of Antrim, in the year 1783, the ruins of a village might be ſeen, deſerted by its inhabitants, who had been obliged to move further into the country.

In the year 1787 the peninſula of Hornhead, in the county of Donegal, contained veſtiges of encloſures, ſo ſmall, and ſo numerous, as to mark the reſidence of a conſiderable number of human families, in a ſpot which then exhibited nothing, but

——— " a deſert, ſalt and bare,
" The haunt of ſeals and orcs, and ſea-mews clang."
Milton.

Somewhat about a century ago the peninſula of Roſsgull, lying between the harbours of Sheep-haven and Mulroy, in the county of Donegal, was ſelected as the reſidence of one of the noble families of Hamilton, titled Boyne. It is to be preſumed there was then but little apprehenſion that the elegant edifice of that age ſhould, after the ſhort interval of an hundred years, ſtand, like Tadmor of the Eaſt, the ſolitary wonder of a ſurrounding deſert.

For the age wherein it was built, and the ſtyle of architecture of that day, the manſion of Roſeapenna may be called elegant. The approach was from a level green on the ſhore, through a ſucceſſion of embattled courts, and hanging terraces, riſing in order one above the other, and adorned with marble piers of no mean deſign and workmanſhip.

The rear was ornamented with gardens, laid out and planted in the faſhion of the laſt century; and the parks and fields of the demeſne ſeem to have been well divided and encloſed.

At preſent every object in this place preſents to view peculiar characters of deſolation. The gardens are totally denuded of trees and ſhrubs, by the fury of the weſtern winds: their walls, unable to ſuſtain the maſs of overbearing ſands, have bent before the accumulated preſſure, and, overthrown in numberleſs places, have given free paſſage to this reſtleſs enemy of all fertility. The courts, the flights of ſteps, the terraces, are all involved in equal ruin; and their limits only diſcoverable by tops of embattled walls, viſible amid hills of ſand.

The manſion itſelf, yielding to the unconquerable fury of the tempeſt, approaches faſt to deſtruction: The freighted whirlwind, howling through every avenue and crevice, bears inceſſantly along its drifted burthen, which has already filled the lower apartments of the building, and begins now to riſe above the once elevated threſholds. Fields, fences, villages, involved in common deſolation, are reduced to one undiſtinguiſhable ſcene of ſterile uniformity; and twelve hundred acres of land are ſaid thus to have been buried, within a ſhort period, in irrecoverable ruin *.

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* It would be teazing to dwell on a repetition of ſimilar examples. I ſhall juſt mention two others. In a ſummer excurſion from College, in the year 1787, paſſing

Hence it appears, that intereſting natural events, the conſequence of ſtorms, have occurred on our coaſts in the latter part of the preſent century, which were not foreſeen, nor even ſuſpected, at its commencement.

Of the Tides.

It cannot be wondered at if theſe tempeſts ſhould have had conſiderable effect on the tides of the ocean. The waters of that element, as long as they are unimpeded by extraneous cauſes, obey the influence of the heavenly luminaries, and ebb and flow with degrees of quantity, and regularity of periods, which come within the reach of human calculation. But when they are agitated by ſtorms,

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from Dunfanaghy to Rutland, along the weſtern coaſt of Donegal, I had great difficulty to diſcover a houſe, ſituated between the river Guidore and the Roſſes iſlands, whither I had been directed to enquire for a guide; and, after much ſearch, at length perceived its roof, juſt emerging from the ſands. The owner told me that his houſe was not long built, and had, at firſt, a conſiderable tract of paſture ground between it and the ſea ſhore, but that, of late, he was every year obliged, with great labour, to dig it out of the encroaching ſands, and purpoſed, ſhortly, to remove it to the oppoſite ſhore of a lake called Mullochdearg, which lay behind the houſe, in deſpair of being able to maintain his preſent ſituation.

A diſputed boundary in Fanet, on the northern coaſt of the ſame country, between the tenants of one of my own glebes and the neighbouring peaſants, is aſcertained by a heap of iron ſcoriæ in the midſt of looſe and ſhifting ſands. Thirty or forty years ago there ſtood here the forge of the village; but no remains of it, or its ſmith, are now diſcoverable, except the cinders of the forge, and the rank weeds that ſpring from a rich ſtratum of earth, once the ſoil of his garden, and ſtill viſible in a hillock of ſand.

ſtorms, or other violent convulſions, their quantities, and periods, become altogether uncertain and incalculable.

Generally ſpeaking, agitation of the ocean, from whatever cauſes it may ariſe, produces encreaſe in the influx and reflux of its tides, as well as deviation from their calculated times; and where the movement of this extraneous influence coincides with the natural direction of the waters, the effects are viſibly diſtinguiſhable by the traces of inundation which attend their unuſual progreſs.

As the tides of our coaſt, raiſed in the Atlantic ocean, flow in upon us from the weſtward, a ſtorm from that quarter invariably gives them an uncommon elevation in our harbours: and this accumulation of waters ſometimes anticipates even the tempeſt itſelf, becoming the forerunner and prognoſtic of its diſtant commencement, and approaching impetuoſity.

Of late years, theſe extraordinary influxes of the ocean have been much greater, and more frequent, than formerly. Every perſon on our coaſts, whoſe ſituation has made the conſtruction or preſervation of embankments againſt the ſea neceſſary, knows, by painful experience, how much his labours have, of late years, encreaſed, and how impotent works, formerly effectual, are now found to be, in repelling the encreaſing tides of the preſent day. Public roads encroached on; walls beaten down; ſtrands leſs paſſable than heretofore; meadow and tillage land oftener, and more deeply inundated; all concur to prove encreaſing tides, and frequency of ſtorms on our coaſts.

THESE phænomena faithfully regiſtered, extenſively and diſtinctly delineated in natural characters, independent of every bias from human ſyſtem or prejudice, free from the uncertainty of caſual records, or the locality of peculiar ſtations for obſervation, ſeem directly to demonſtrate an unuſual and encreaſing violence in the winds of our climate during the preſent century. That theſe tempeſts have chiefly borne upon us from the weſtward, is plain from the ſame general appearances: for, where local circumſtances have not directly interfered in oppoſition, the trees, ſhrinking before the preſſure from the ocean, have univerſally yielded to the weſtern blaſt. The ſands have drifted, and the tides ruſhed upon us from the ſame quarter, evidently demonſtrating the more frequent recurrence, and ſuperior potency, of the Atlantic ſtorms.

Of the Effects of theſe Weſtern Tempeſts on the general Temperature of the Climate.

IN a paper, honoured with a place in the ſecond volume of the tranſactions of the Academy, I recorded the reſult of ſome experiments made in the year 1788, for the purpoſe of aſcertaining the temperature of the earth in our latitudes.

FROM theſe experiments it appears, that the medium temperature of the kingdom of Ireland, from its ſouthern to its northern extremity, nearly coincides with the ſtandard aſſigned to correſpondent degrees of latitude in Mr. Kirwan's ingenious tables *.

It is further diſcoverable, that the general warmth of our iſland is in no reſpect inferior to that of other countries in its parallel: from whence we are naturally led to conclude that the annual quantity of heat received here, is not leſs, in our day, than it was in former ages.

If theſe things are ſo, it may be denied that there is any ſubſtantial foundation for the frequent complaint of change in our ſeaſons. The ocean may be agitated by ſtorms, ſands be drifted along our coaſt, and trees blaſted in mountainous and expoſed ſituations;—but why ſhould the farmer lament the diminiſhed ardour, and ſhortened period of his ſummers; as if winter poſſeſſed more than its natural portion of the revolving year? Whence ſhould ariſe the gardener's complaints, that his peaches, however ſheltered from ſtorms, rarely now arrive at maturity, and that his May-duke cherries, even in the moſt favoured aſpects, no longer merit that diſtinguiſhed title?

May I be permitted to aſſume, as true, the fact which it has hitherto been the purpoſe of this paper to demonſtrate, and in ſupport of which the trees, the ſands, and the tides of our iſland, ſeem to bear conſiſtent and unequivocal teſtimony; namely that,

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* See Kirwan's Eſtimate of Temperatures.

of late years, the weſtern winds have blown with encreaſed violence. From that ſingle principle an anſwer may be deduced to all theſe intereſting queſtions.

It is a matter well known, and eaſily to be explained, that the ſurface of the ocean varies leſs from the mean annual temperature of its latitude than land in the ſame parallel *: that is, the ſurface of the ſea is colder in ſummer, and warmer in winter, than the ſurface of the ground in that latitude.

If then the prevalent winds of any country blow over an ocean ſituated in its parallel, that country will relatively be denominated temperate; it will be free from all extremes; the heats of ſummer, and the colds of winter, will be checked by ſea breezes of a contrary property; and the land, influenced by the neighbouring element, muſt, more or leſs, partake in its equability of temperature.

Such is the caſe in almoſt all the iſlands of the world; and ſuch, from immemorial ages, has been the peculiar character of Ireland. Hither come the weſtern winds, modified by the temperature of the broad Atlantic ocean which they traverſe in their career: Hither fly the clouds, teeming with moiſture collected in a courſe of three thouſand miles along its ſurface: and here uniformity of temperature, and redundant humidity, have always been marked as the diſtinguiſhed character of our ſoil.

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* See Kirwan's Eſtimate of Temperatures.

SINCE then the trees, the ſands, and the tides demonſtrate that theſe winds have, of late years, blown with unuſual violence; ſince they bear teſtimony that a large quantity of air, thus directed, thus tempered and ſurcharged, has paſſed over our lands; it plainly follows that the climate muſt have felt the change; that it muſt have experienced colder ſummers and milder winters than heretofore, approaching towards that equability of heat, and redundance of moiſture, which the farmer and the gardener at preſent ſo heavily lament.

BUT it is not from encreaſe of quantity alone that theſe winds have produced their effects. They have altered the temperature of the ocean itſelf; and thus have, as it were, multiplied their changeful influence on the land; acting there, at once, with new properties, as well as with encreaſed quantity.

THE ſurface of water, in a ſtate of tranquillity, admits of greater variations of temperature than in a ſtate of agitation. It may become much hotter in ſummer, and colder in winter, when calm, than when diſturbed: for the particles at the ſurface, when heated or cooled, do not immediately give place to others nearer the bottom; the proceſs of commixture, in a tranquil ſtate, is gradual, and the tranſmiſſion of change ſomewhat reſembles the flow and retarded progreſs that takes place on the land. Agitation always counteracts this gradual proceſs; a rapid commixture of the particles produces a quick aſſimilation of temperature throughout the whole maſs, and thus, taking away all partial exceſs, reduces the whole toward a medium ſtate of uniformity.

THUS ſummer tempeſts always tend to diminiſh the ſuperficial heat of an ocean over which they ruſh; while winter blaſts, agitating the waters at conſiderable depths, reſiſt the natural cold of the ſeaſon by a ſupply of relatively warm particles, which ariſe from the bottom toward the ſurface.

THAT the Atlantic ocean, the vaſt and potent arbiter of our ſeaſons, has ſuffered unuſual agitation of late years, ſeems evident from the natural phænomena recorded in the beginning of this Memoir. The trees, and ſands of our iſland, bear teſtimony to the ſtorms which ſweep along its ſurface; and the tides come to us as frequent, and unerring meſſengers of the tumultuous and agitated ſtate of its billows, attendant on their furious career.

FROM this perturbed abyſs of waters has ariſen an unceaſing influence, equally potent to check the ardour of the ſummer ſolar beams, or to relax the ſhackles of a northern winter. By this prevailing influence ſummer has been rendered impotent to raiſe and ripen many of our crops, and the farmer, taught by neceſſity, learns now to hand them over ready grown, and prepared for the maturity of ſummer, under the mild temperature of an Atlantic winter. Hence too the gardener has, of late years, been compelled to call in the aid of artificial heat to forward the peach, the nectarine, the grape, and every other ſpecies of delicate fruit, to perfection.

HENCE premiums now vainly tempt the growth of hemp, which formerly peaſants, in the moſt northern counties in Ireland, cultivated without reward around their cabbins for domeſtic uſe: And hence the ancient apiaries of our iſland, once ſo celebrated, and guarded with ſuch ſpecial and minute attention by the Brehon laws *, are now extinct; and honey, from being a common article of popular conſumption, has become a rare luxury, or an expenſive medicine.

WINTER has likewiſe felt the general influence of this Atlantic temperature; our graſſes ſcarcely droop beneath the froſts; wheat and oats vegetate in the open fields during the very ſolſtice itſelf; myrtles and laurels, in ſheltered ſituations, brave the ſeverity of winter: The Foyle, and other large rivers of the northern province, frequently ſubject to the icy chains of former ages, now run in uninterrupted freedom †.

FACTS, ſuch as theſe, are to be conſidered as the baſis of general opinion concerning the alteration of our climate; while old age, connecting theſe appearances with the fragility of declining life, and a decayed conſtitution, has become querulous in proportion to its feelings, and, judging of external phænomena by the exaggerated teſt of its own acute ſenſations, emphatically pronounces, that the ſeaſons are now leſs favourable than formerly.

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* See Collectanea de Reb. Hib. Tranſl. Brehon Laws.

† Fifty years have elapſed ſince the River Foyle has been effectually frozen over at Derry: It is alſo obſerved, that the River Thames, in Britain, is leſs frequently frozen of late years than formerly. See Archæologia Britannica, vol. iii. p. 55.

On the Conſequences of this Equability of Temperature to animal and vegetable Life.

FROM the tranſient peruſal of this Memoir, a rapid and impatient mind would probably draw numberleſs falſe concluſions. The facts here recorded ſeem to wear a gloomy aſpect; to mark a gradual deterioration of our ſeaſons; to indicate a climate, harſh, ungenial, and of conſequence ſterile in its nature; clouded, humid, tempeſtuous; cheerleſs, and unfriendly to animal and vegetable life.

ALL theſe concluſions contradict experience, and may be overturned by a calm conſideration of the phænomena themſelves.

EXPERIENCE teaches us that dry ſeaſons, and eaſterly gales, are, in our iſland, invariable ſources of feeble vegetation, and numerous diſeaſes *; and the hiſtory of the world informs us that winds, whether hot or cold, are in their nature deleterious to animal and vegetable life, in proportion as they become deprived of humidity. The warm air of the African deſert breathes deſolation over the parched land of Egypt and Syria, before it is yet felt as a tempeſt †. Even our own weſterly winds, the Atlantic meſſengers of health and fertility to our iſland, after traverſing the cold and dry tract of the vaſt Siberian continent, bear nothing but ſterility,

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* Of this the Influenza, attendant on the eaſterly winds of ſpring, in the preſent year (1795) affords a ſtrong inſtance.

† See Volney's Account of Egypt and Syria.

rility, and almoſt perpetual winter, to the unhappy climate of Kamſchatka *.

HEAT or cold in extremes; dry air in rapid motion, and moiſt air in a ſtagnant ſtate, ſeem to be the principal external ſources of human diſeaſes; and climates are generally found favourable to health and longevity, in proportion as they are exempt from theſe natural cauſes of diſorder and decay.

IT ought therefore to be inferred, a priori, that Ireland, celebrated for the ſingular equability of its temperature, and the ceaſeleſs motion of an atmoſphere always influenced by the moiſture of the Atlantic, ſhould be likewiſe characteriſtically free from natural diſeaſe; and experience proves that this concluſion is true.

THE exhauſting agues of North America, or the fens of England †; the fatal fluxes which prevail in the low countries of the continent of Europe; the dreadful bilious diſtempers of both the Indies; the peſtilence which deſolates the African and Aſiatic climates; are all either entirely unknown, or but feebly felt in Ireland. There is here no characteriſtic diſeaſe to mark a natural ſource

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* The latitude of Kamſchatka correſponds to that of Ireland; the weſterly winds are prevalent in each; yet the former experiences a rigorous winter of nine months, and the latter rarely of as many days. See Cook's Voyage in 1779, vol. iii. ch. 6.

† The ague is ſo rare, in ſeveral parts of Ireland, that many perſons are totally unacquainted with it. In the northern province the Author has never met with the diſeaſe, and its exiſtence there is generally denied.

ſource of unhealthfulneſs. There are few diſorders which cannot be directly traced up to ſome artificial cauſe; to ſome intemperance, to ſome neglect, to ſome exceſs, either of luxury or penury, in the ſuffering ſubject. Manufactures, in their kind, unwholeſome; induſtry exerted beyond its proper limits; irregularity in food or fermented liquors; illicit amours; colds, the conſequence of folly or inattention; exceſs or deficiency of proper exerciſe; anxiety and fretfulneſs of mind; together with the copious liſt of caſualties, afford to the phyſician of this country, the cauſes, and explanation, of almoſt all its diſorders.

FROM its peculiar ſalubrity the natives of this iſland are celebrated through Europe for juſt ſymmetry of proportion, and an athletic frame; becauſe, from earlieſt infancy to manhood, a check is rarely given to the progreſſive encreaſe of animal ſtrength, or the natural and appropriate forms of an undiſeaſed body. From the ſame Hygeian ſource flow thoſe ardent paſſions, thoſe exuberant ſtreams of animal ſpirits, which render our natives always chearful, oftentimes turbulent and boiſterous, the uſual conſequences of uninterrupted health and a vigorous conſtitution. Hence wild adventure, perſonal courage, impetuoſity of purſuit, inattention to conſequences, and improvidence of diſpoſition, become the characteriſtic features of minds, ſeldom under the influence of that anxiety, which, flying from the preſent moment and its enjoyments, watches for futurity, and pants after remote felicity.

THE general temperature of our climate, in the vicinity of the capital, is ſomewhat lower than the 50th degree of Farenheit's thermometer *; and a mean of the hotteſt or coldeſt months of our year rarely varies more than 10 degrees from this ſtandard heat †. Winter therefore, with us, is uſually accompanied by a temperature of 40 degrees; ſpring and autumn of 50 degrees; and ſummer of 60 degrees of the thermometer: and the general heat of any ſingle month of theſe ſeveral ſeaſons ſeldom varies much from the correſponding temperature of that particular ſeaſon to which it belongs.

OF theſe limits, the loweſt is not ſufficiently cold to check the growth of any of the natural herbage of our iſland, nor the higheſt powerful enough to parch the ſurface of a moiſt ſoil, or to ſcorch its luxuriant graſſes. Hence it comes to paſs that our fields maintain a perpetual verdure, unimpaired by either ſolſtice. Hence too the farmer is enabled to lay his lands under graſs almoſt at any ſeaſon, even at the commencement of winter ‡: and hence the grazier never loſes the benefit of his rich paſtures at any period of the year, unleſs during the tranſient paſſage of a temporary drift of ſnow; ſo that horſes, cattle, and ſheep, arrive here, with

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* See Hamilton's Paper on the Temperature of Ireland, in the ſecond volume of theſe Tranſactions.

† See State of the weather in Dublin, from June 1791 to June 1793, by Mr. Kirwan, Vol. V. of the Tranſactions.

‡ See Young's Tour in Ireland, Vol. I. p. 130.

little care, at a degree of perfection unattainable in other countries without infinite expence and trouble.

For the growth of flax, the ſtaple commodity of the kingdom; of potatoes, the general food of its inhabitants; and of barley, from whence the ardent ſpirits, and other fermented liquors of the country are derived; the climate ſeems to poſſeſs a peculiar felicity of temperature and moiſture, in all its ſeaſons; and for their neceſſary degree of ripeneſs, the heat of ſummer is amply ſufficient.

It is for the more delicate ſpecies of garden fruits; for ill conducted crops of oats in bleak and mountainous ſituations; and for the complete and perfect maturity of wheat; that uneaſy apprehenſions can ever be entertained by the gardener or the farmer.

The former are, in themſelves, of little importance; and where ſuch luxuries are required, glaſs coverings, and artificial heat, afford an ample ſupply, and remove all pretence for diſcontent. Human art and induſtry, attentive to circumſtances, and accommodated to times, has ſtolen from the mild temperature of our winters as much warmth, as ſerves to compenſate for the deficiency of ſummer heats in forwarding and perfecting the crops of wheat; and a little time will teach the farmer, in our mountainous provinces, to uſe the ſame artifice with reſpect to his oats, whenever neceſſity ſhall demand his encreaſed attention.

To ſum up matters, then, with truth and brevity—A denſity of population, ſurpaſſing that of the vaunted millions of undepopulated France*; a copious export trade in proviſions of various kinds, unequalled by any kingdom whoſe inhabitants are proportionably numerous†; and a ſtaple manufacture unrivalled in

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* The inhabitants of Ireland amount to more than four millions. (See Mr. Buſhe's Memoir, Iriſh Tranſ. Vol. III.)

Hence, the denſity of its population is at the rate of 182 perſons to a ſquare geographical mile, ſuppoſing the iſland to contain, in round numbers, 22000 ſuperficial miles.

Mr. Zimmerman, in his Political Survey of Europe, erroneouſly ſuppoſing the inhabitants of this country leſs than two millions and a half, deduces a denſity of population equal only to 117 perſons on each mile. The following table marks the number of individuals on a geographical ſquare mile in the northern countries of Europe, as taken from Zimmerman's tables (Ireland being corrected) from whence it will appear that this kingdom rates extremely high in the denſity of its population.

	Perſons.
Denmark	12
Sweden	14
Ruſſia	20
Scotland	51
Poland	53
Pruſſia	67
England	129
Germany	135
France	152
Ireland	182
Holland	236

† Two hundred and twenty thouſand barrels of beef and pork, independent of the various matters connected therewith, and of every other ſpecies of proviſions, were exported in the year ending 25th March 1793.

in general uſe, in certainty of produce, and intrinſic value *; are circumſtances which have not fallen to the lot of other nations, and bring with them clear and irrefragable evidence to demonſtrate a ſalubrious country, a genial climate, and a fertile ſoil in Ireland.

Concluſion.

IN this Memoir I have endeavoured to prove from natural, and almoſt incontrovertible regiſters of the phænomena of later years, that the winds, and particularly the weſtern ſtorms, have ſwept with encreaſed violence over Ireland.

FROM this fact I have deduced a neceſſary change in its climate; a more general equability of temperature through the year; ſummers leſs warm, and winters more mild and open: and, laſtly, I have endeavoured to ſupport this concluſion by general obſervation, and the enumeration of particular inſtances where the defect of ſummer heat and winter ice ſeem to be moſt ſtrongly marked.

ONE queſtion ſtill remains, curious in its principle, and intereſting in its ſolution—Why have theſe weſtern ſtorms blown with unuſual and encreaſed violence?

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* After a progreſſive encreaſe of ninety years, the exports of linen cloth alone, in the year 1792, amounted to forty-three millions of yards, from one million only at the commencement of the preſent century.

THE limits of a Memoir, ſuch as this, do not permit me to enlarge on this ſubject, and even appear to include a reproof for the length of the preſent interruption. I ſhall, therefore, treſpaſs no longer on the moments of the Academy than to ſuggeſt a few queries, which may ſtand over for future conſideration; leaving it to time, and the ingenuity or better directed obſervations of others, to verify, to diſprove, or to contemn the hints which may be contained in them.

1ſt, Have not our winds become more violent, and the temperature of our ſeaſons more equable, ſince the foreſts of Ireland were cleared, and the country cultivated? and have not theſe winds, and that equability of temperature, been nearly proportioned to theſe, as to their cauſes?

2d, HAVE not ſimilar changes occurred under analogous circumſtances in North America; even in Canada, that country of extremes in heat and cold? And did not the iſland of Bermudas, though ſituated ſo much to the ſouthward of us, become barren of fruit, in conſequence of the deſtruction of its timber trees?

3d, HAS it not appeared from obſervations on the aſcent of balloons, and the motion of clouds, that the lower maſs of air often purſues a different courſe from the upper ſtratum? May not then the limits of our ſtormy currents of air be often confined within a few hundred yards of the ſurface of the earth? and if ſo, is it not poſſible, and even probable, that the frequent interruption of foreſts and groves, and hedge-row trees, might have formerly very much retarded, and finally checked, the progreſs of a tempeſt?

4th, HAVE not all the countries of Europe, Aſia and America, within the parallel of Ireland, been very much denuded of their foreſts within the preſent century? and have not the encreaſed velocity of the weſterly winds been proportioned to this deſtruction of the foreſts and trees, as to their natural cauſes?

5th, Is it not probable, ſince the prevalent winds of our parallel have a weſterly tendency, that circumſtances which have removed impediments to their career round the entire globe, would give encreaſed velocity to their courſe?

6th, SHOULD not Ireland, launched as it is into the Atlantic, beyond the other coaſts of Europe; and denuded, as it has been, of foreſts and hedge-row trees, be the moſt ſenſibly affected by encreaſing tempeſts from the weſt, and the firſt to experience their influence on its climate?

WHETHER theſe queries have any foundation in nature, or are merely to be eſteemed the reſult of an unreſtrained imagination; whether ſo diminutive an animal as man, ſo temporary in duration, ſo impotent in ſtrength, acting through the lengthened period and perſevering efforts of a large portion of his ſpecies, can reaſonably be deemed equal to the involuntary production of ſuch vaſt effects; to a change even of the elements and climates of the earth, may admit of doubt, of oppoſition, and even of denial. For theſe reaſons I have taken the liberty ſimply to propoſe them as matters of enquiry, and only beg the indulgence of the Academy for troubling them with matters that may not be attended with ſufficient evidence to bring conviction, or even to eſcape cenſure.

POSTSCRIPT.

October 20th, 1795.

THE preſent year (1795) has been, comparatively, cold in its commencement, and warm in its ſummer; it has been calm, dry, and in many reſpects a contraſt to the long ſeries of preceding years whoſe effects are regiſtered in this Memoir.

YET the extremes of its temperature have not been equal to thoſe of former years, as far as can be inferred from the recorded effects of heat and cold on natural objects. The large rivers of the northern province have not been bound firmly in the icy chains of winter; nor have grapes ripened in favourable aſpects in any part of the kingdom during ſummer, as formerly occurred, in ſeaſons whoſe temperature was denominated extreme.